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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,211	11/12/2003	Pietro Erratico	854063.618D1	8271

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EXAMINER	
ECKERT II, GEORGE C	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 10/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/712,211	ERRATICO ET AL.	
	Examiner	Art Unit	
	George C. Eckert II	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-12 and 15* is/are rejected.

7)☒ Claim(s) *5,6,13,14,16 and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/797,206.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/12/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. An application in which the benefits of an earlier application are desired must contain a specific reference to the prior application(s) in the first sentence of the specification or in an application data sheet (37 CFR 1.78(a)(2) and (a)(5)). **Please amend the first sentence to include the status of the parent application (e.g. "now US 6,693,039").**

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No.09/797,206, filed on February 27, 2001.

Claim Objections

3. Claim 6 is objected to because of the following informalities: on line 2, insert --layer-- after "grown". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 11, 12 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by both US 4,895,616 to Higashi et al. and US 5,347,869 to Shie et al. Higashi et al teach in figures 3 and 5, a structure comprising

a semiconductor material body (11, fig. 4a)

a cavity ("pit") formed in the body and having the claimed shape including sloped side walls and parallel top and bottom walls;

a cover over the cavity (layers 14-16, fig. 2) formed on the upper surface of the body; and

a communication opening extending in the cover to the cavity (e.g. 40-47, 50-57, figs. 3 and 5).

The openings 40-47 and 50-57 may also be considered a lattice in the cover.

Alternatively, as in claim 15, the lattice has openings which are then filled by a coating layer so that the openings are closed and the final structure is merely a cover layer with communication openings therein.

Shie et al. teach, in figures 6a-g, a structure comprising:

a semiconductor body 60;

a cavity 66 formed in the body and having the claimed shape including sloped side walls and parallel top and bottom walls;

a cover over the cavity (layers 61 and 63) formed on the upper surface of the body; and

a lattice 62 having a plurality of openings (spaces) formed on the upper surface of the body; and

communication openings (fig. 6(g), the spaces on either side of the cover over the cavity) extending in the cover to the cavity.

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by US 6,512,283 to Davies. Davies teaches in figure 9 a structure comprising:

a buried cavity 200 in a semiconductor material body 10 having a shape, in cross section in which a top wall is approximately parallel with a horizontal plane of the material body (the top of the cavity may be considered the low tips of elements 15 which comprise a horizontal top plane) and a bottom wall which is parallel with the top wall. Though Davies show in figure 9 a cavity wherein the walls do not slope, Davies teaches in column 5, lines 51-65 that the cavity may be formed by an anisotropic etch such that the walls would be sloped (as is also taught by applicant's specification, p. 6, lines 24-27).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 2-4, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over '283 to Davies in view of US 6,747,333 to Xiang et al. As discussed above, Davies teaches the device of claim 1. Davies further teaches the device including a lattice 13 (figures 2 and 3) having a plurality of interstitial openings 20 (fig. 2) formed as the top wall of the cavity, the interstitial openings 20 filled with TEOS 55 (fig. 8, col. 6, lines 21-22) and the interstitial openings having a square or rectangular shape (fig. 2 and col. 4, lines 57-58). However, Davies teaches that the

lattice is comprised of a layer of oxide only and does not teach that the lattice is comprised of a silicon dioxide layer and a silicon nitride layer.

Xiang et al teach, with reference to figure 6, a mask layer comprising an oxide layer 18 and a silicon nitride layer 20. The mask layers are used in forming a cavity 26 in silicon layer 16. Davies and Xiang et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form the device of Davies using both a silicon nitride and silicon oxide layer as an etch mask. The motivation for doing so, as is taught by Xiang et al., is that the upper layer of nitride serves to protect underlying structural elements and provide a base on which an upper mask layer may be formed (col. 6, lines 45-56). Therefore, it would have been obvious to combine Davies and Xiang et al. to obtain the invention of claims 2-4, 7 and 8.

7. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daives and Xiang et al. as applied to claim 2 above, and further in view of US 4,706,061 to Johnson. Davies and Xiang et al make obvious the device of claim 2 but do not teach that the lattice has a specific orientation. Johnson teaches in figures 1e, 2 and 3 a lattice of layers 12 and 14 which has interstitial openings 18 oriented at an angle of 45° to the <110> plane of the semiconductor body 10 (col. 1, lines 61-68).

Johnson is combinable with Davies and Xiang et al as they are from the same field of endeavor. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to form the device made obvious by Davies and Xiang et al. to further have the lattice formed with specific orientation to a crystal plane of the underlying semiconductor body. The

motivation for doing so, as is taught by Johnson, is that the specific orientation allows controlled etching and thus controlled depth of the cavity in the semiconductor body (col. 2, lines 24-32). Therefore, it would have been obvious to combine Johnson with Davies and Xiang et al. to obtain the device of claims 9 and 10.

Allowable Subject Matter

8. Claims 5, 6, 13, 14, 16 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not teach or suggest, either alone or in combination, a structure wherein the interstitial cavity openings are filled with polysilicon, as instantly claimed and in combination with the additional cited elements.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional cited art teaches various structures having cavities formed in a semiconductor body. The art also teaches etching on specific lattice planes of a semiconductor.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Eckert II whose telephone number is (571) 272-1728. The examiner can normally be reached on 8:00 - 5:30, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GEORGE ECKERT
PRIMARY EXAMINER